Steel Bridge Preservation: Build to Last

5/15/2024 | Webinar

United For Infrastructure Week

United for Infrastructure's 12th annual Infrastructure Week

For more than a decade, United For Infrastructure (UFI) has proudly presented Infrastructure Week as an annual, nationwide event focused on raising awareness about the importance of infrastructure and advocating for improvements that address some of our nation's toughest challenges in transit and transportation, water systems, energy and more.

As public infrastructure projects supported and funded by the Bipartisan Infrastructure Law begin to break ground and transform communities from coast to coast, UFI and our partners will continue to spread awareness on the law's impacts and the potential for transformative investment.

United For Infrastructure

https://www.acceleratoraction.org/infra-week-2024

Welcome to Infrastructure Week 2023

The webinar is accredited by AIA & RCEP to provide 1.0 PDHs / LUs (qualifies for an HSW credit for AIA)

- Please use the "Q & A" button to ask questions during the event.
- Dustin Young (AISI/SSSBA), Jeff Cunningham (AGA) & Brandon Jones (AGA) will answer questions online
- We will also answer questions "live" at the end of the webinar.

AGA will email a copy of the slide deck to all attendees within 2 business days of the event.

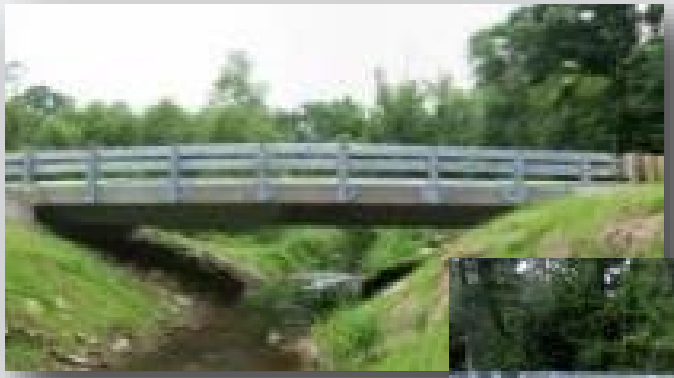
United For Infrastructure

https://www.acceleratoraction.org/infra-week-2024

Short Span Steel Bridge Alliance – Who We Are

A group of bridge and buried soil structure industry leaders who have joined together to provide educational information on the design and construction of short span steel bridges in installations up to 140 feet in length.

Rolled Beam & Plate Girder



Buried Bridges

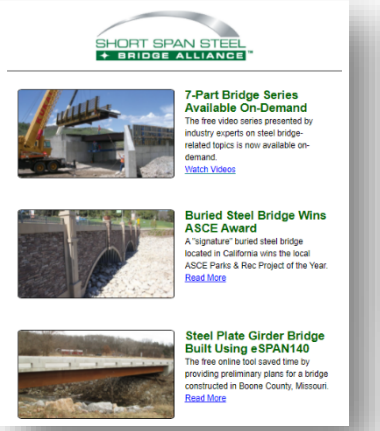
Truss

SHORT SPAN STEEL BRIDGE ALLIANCE™

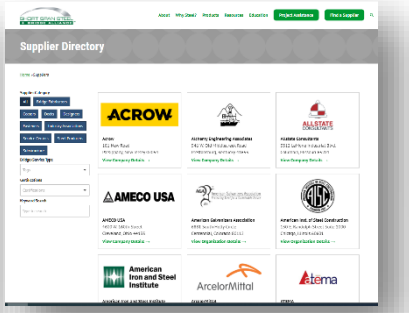
Press Brake Tub

5 Ways to Keep Learning About Steel Bridges

1. Subscribe to the Weekly Newsletter



2. Find a Supplier



3. Design a Bridge in 5-Minutes

eSPAN140™

4. Receive Free Project Assistance

5. Schedule a Workshop/Webinar

Free Customized Workshops for Counties, DOTs, and Design Firms

Topics: Education, Events, Professional, Recommended

Short span bridges provide vital links in the nation's infrastructure network. Yet, nearly a quarter of these bridges are classified as structurally deficient or functionally obsolete.

According to ASCE, more than 30% of existing bridges have exceeded their 50-year design life. This situation presents a significant challenge for cash-strapped state and local governments.

The SSSBA has developed technological and design innovations for bridges under 140 feet that save significant time and costs for county and state bridge officials.

Over the past 10-years, over 17,000 bridge owners and designers have learned about the cost and time advantages of short span steel bridges in SSSBA workshops and conferences throughout North America.

And now, the SSSBA is offering **complimentary** customized educational guest speakers/webinars and workshops (on-site or virtual) specifically for county engineers, state DOTs, and design firms. The webinars/workshops are taught by industry experts with decades of experience in the cost-effective design and construction of short span bridges.

The workshops can be set up as:

- 1-2 hour webinar on a specific topic (can be used as a "guest speaker" for your event).
- 3-4 hour (half-day) workshop to provide practical information on the safe and cost-effective design, detail, fabrication and installation of short span steel bridges.
- 6 hour (full-day) session to provide an in-depth overview of short span steel bridges.

View Sample Agenda

Suggested topics to select from include:

- Practical and Cost-Effective Steel Bridge Design
- Free Design Tools (eSPAN140 and SIMON)
- Pre-engineered Bridge Solutions
- Coating Solutions (galvanized, painted, and weathering steel)
- Innovative/Accelerated Bridge Construction Options
- Case Studies (from local counties)
- Buried Soil Steel Bridge Structure Alternatives
- Life-Cycle Analysis

For more information or to customize a workshop for your organization, please contact:

- Dan Snyder (Director of the SSSBA) at dsnyder@steel.org or 301-367-6179.
- Michael Barker (University of Wyoming & SSSBA Director of Education) at barker@uwyo.edu

www.ShortSpanSteelBridges.org

Questions? Dan Snyder, Director, SSSBA, dsnyder@steel.org

Twitter: @ShortSpanSteel

Facebook: Short Span Steel Bridge Alliance

About the American Galvanizers Association (AGA)

- Non-profit trade association established in 1933
  - Serves as a *unified voice* and provides *expertise* in the after fabrication hot-dip galvanizing industry
- Provides technical support on innovative application and technological developments in hot-dip galvanizing for corrosion protection
  - Free assistance for North American specifiers
  - Resource for our members

Presenter

John Krzywicki
Marketing Director
American Galvanizers Association
jkrzywicki@galvanizeit.org

Continuing Education Statement

- The AGA has met the standards and requirements of the Registered Continuing Education Program. Credit earned on completion of this program will be reported to RCEP at RCEP.net. A certificate of completion will be issued to each participant. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the RCEP.

- AIA/CES Policy on Endorsement -The following program is registered with AIA/CES and does not include content that may be deemed or construed to be an approval, sponsorship or endorsement of any material of construction or any method or manner of handling, using, distributing or dealing in any material or product.

Galvanize It!

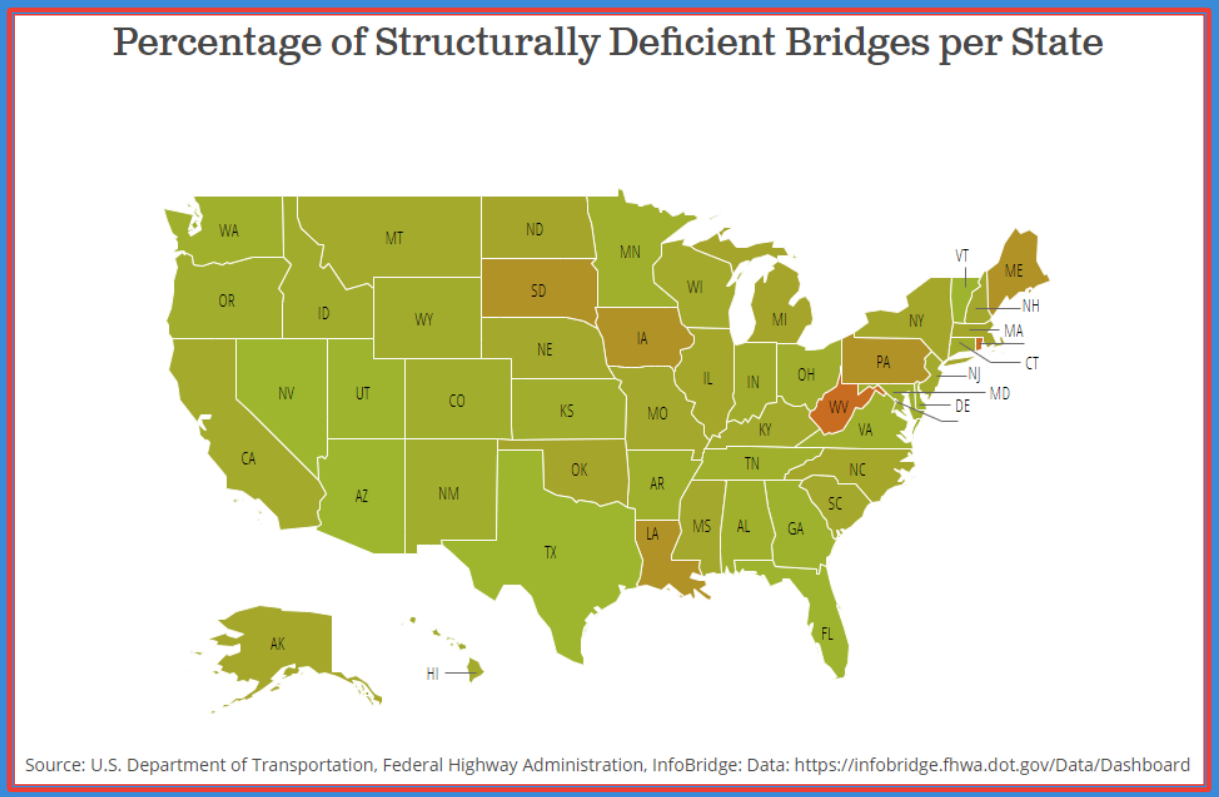
Learning Objectives

- Upon seminar completion, you will be able to:
  - Learn how bridge durability systems plays a critical role in protecting our nation's infrastructure
  - Identify reasons specifiers choose corrosion protection systems based on durability, availability, versatility, sustainability, and aesthetics
  - Recognize the sustainable aspects of bridge durability systems by analyzing the environmental, social and economic impacts of use from production through end-of-life.
  - Understand the benefits various bridge durability systems backed by research

The Current State of the Bridge Market

Current State of Our Bridge Infrastructure

- In 2021, ASCE Infrastructure Report Card graded Bridges as a C
- U.S. has 617,000 bridges
  - 42% are 50+ years old
  - 7.5% (46,154) are structurally deficient
- Most bridges designed for 50-year life
  - Approximately half are at or near this lifespan
- Funding/Focus have been prioritized
  - Still insufficient to meet the demands of the current state of bridge infrastructure



Planning for the Future: Infrastructure Bill

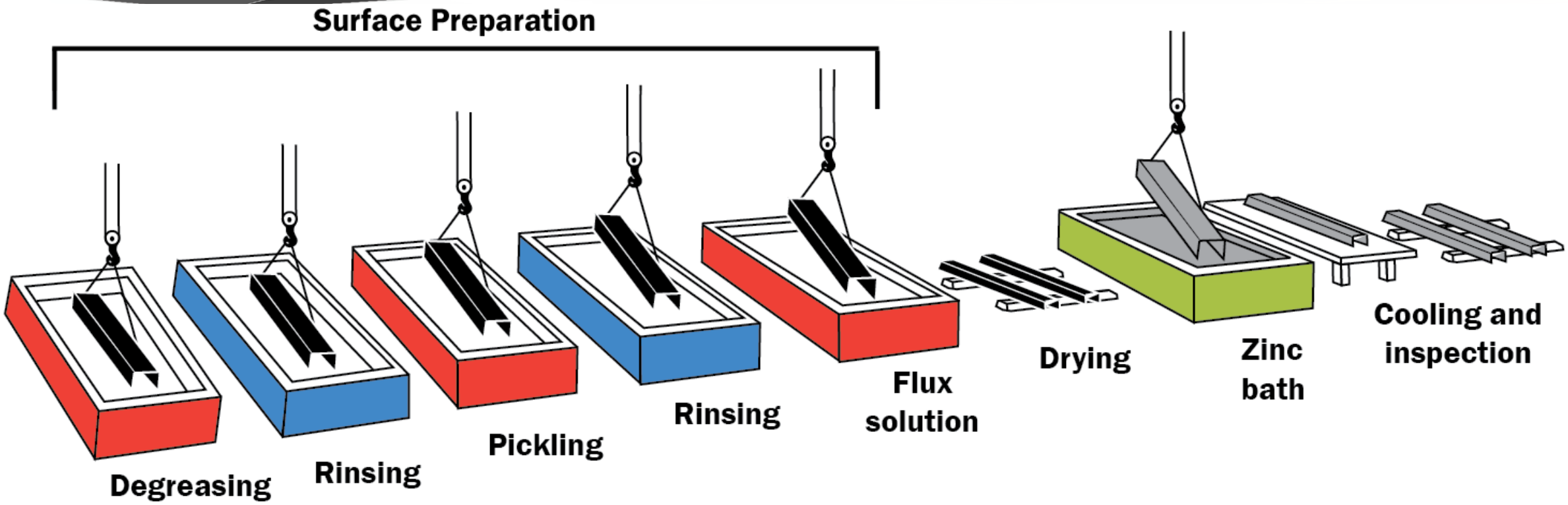
- Infrastructure Investment and Jobs Act (IIJA)
  - $1.2 Trillion investment
- Funding Highlights
  - $110 B – Roads & Bridges ($40 B - bridge replacement, repair, rehab)
  - $73 B – Electric Grid & Power Infrastructure
  - $66 B – Passenger/Freight Rail + $39 B – Transit
  - $65 B – Broadband Investment
  - $55 B – Water Systems + $50 B – Water Storage
  - $25 B – Airports
  - $17 B – Ports/Waterways
  - $11 B – Road Safety

Steel Bridge Durability Systems

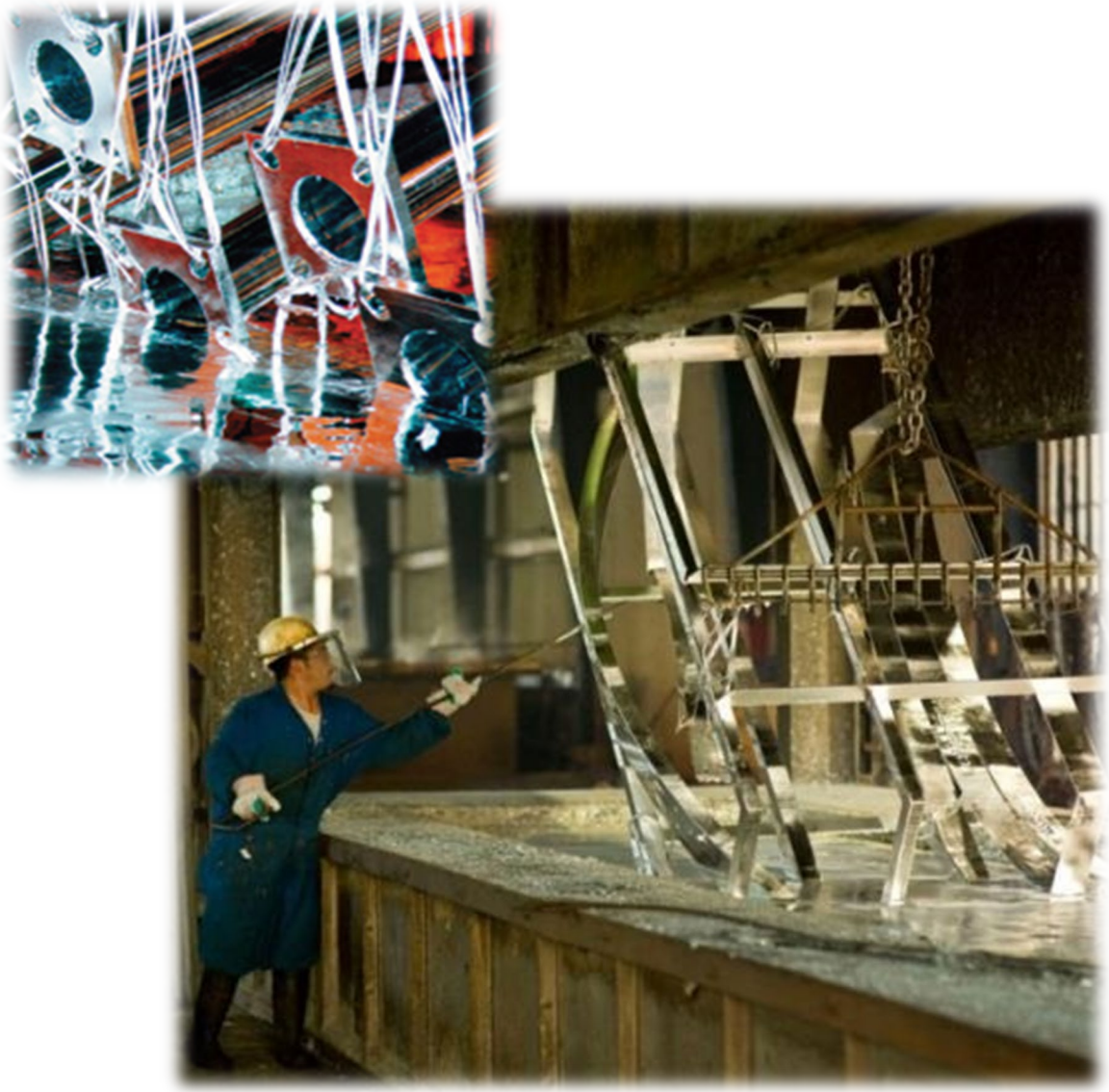
- Hot-Dip Galvanized Steel
- Weathering Steel
- Protective Coating System
  - Paint/Powder Coatings
- Thermal Spray Metallizing (TSZ)
- Duplex Systems
  - HDG + Protective Coating
  - TSZ + Protective Coating

Hot-Dip Galvanizing

Hot-Dip Galvanizing Process Overview



Galvanizing



- Steel immersed in bath (kettle) of molten zinc (~830 F)
- Bath chemistry >98% pure zinc
  - Up to 2% additives (Al, Bi, Ni)
- Molten zinc reacts with iron in steel to form metallurgically-bonded coating
- Reaction is complete when steel reaches bath temperature

Inspection

- Steel inspected after galvanizing to verify conformance to specs
- Visual inspection with naked eye
- Coating thickness checked by magnetic thickness gauge
- Download free Inspection App for clear visual guide to surface conditions
  - galvanizeit.org/mobile

Why Specify Hot-Dip Galvanizing?

Long Lasting Corrosion Protection

Barrier protection resists corrosion by isolating steel from the environment

Barrier Protection

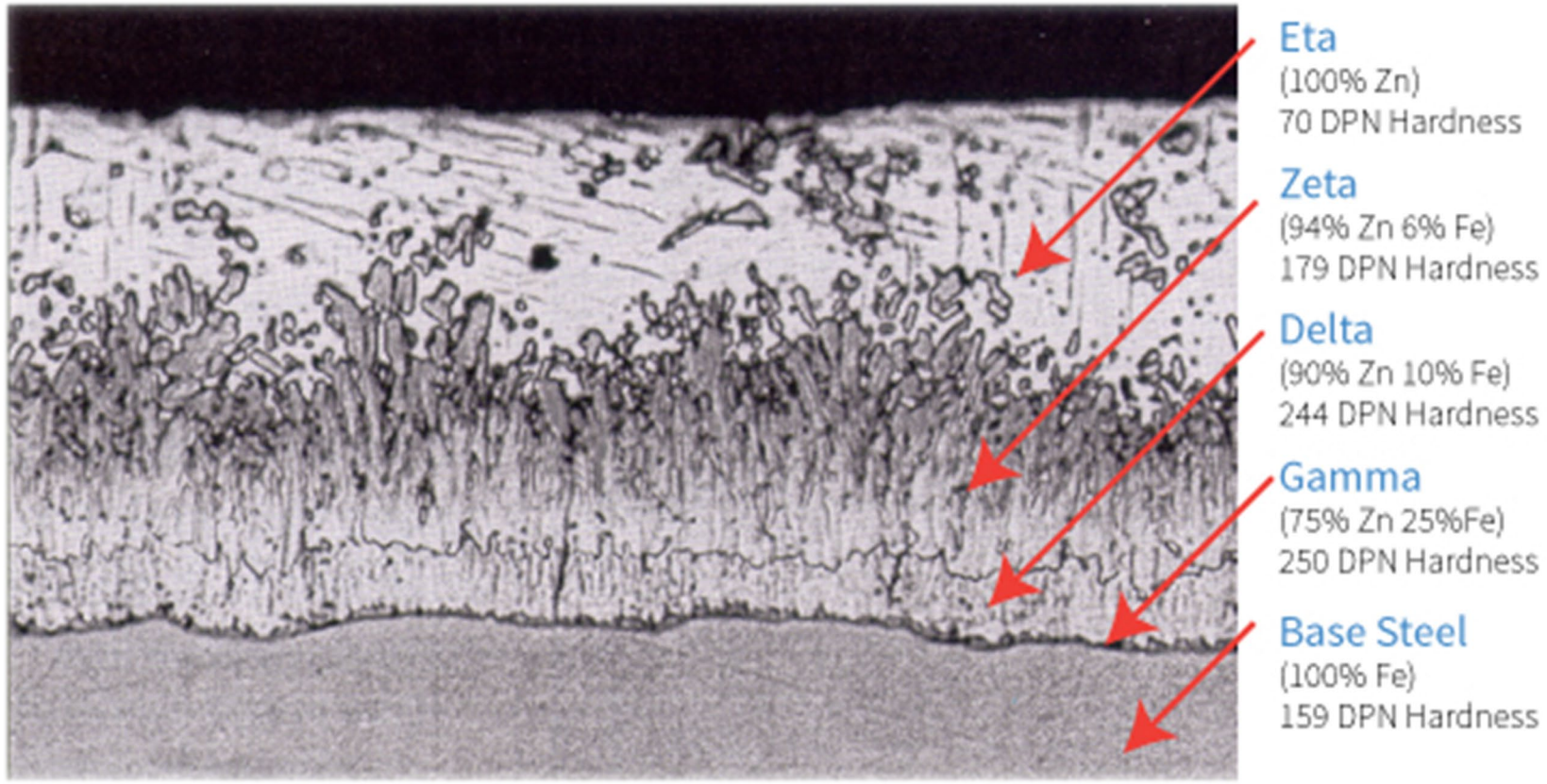
Zinc is anodic to steel and will sacrificially corrode to protect the underlying steel until all the surrounding zinc is consumed

Cathodic Protection

Zinc Patina

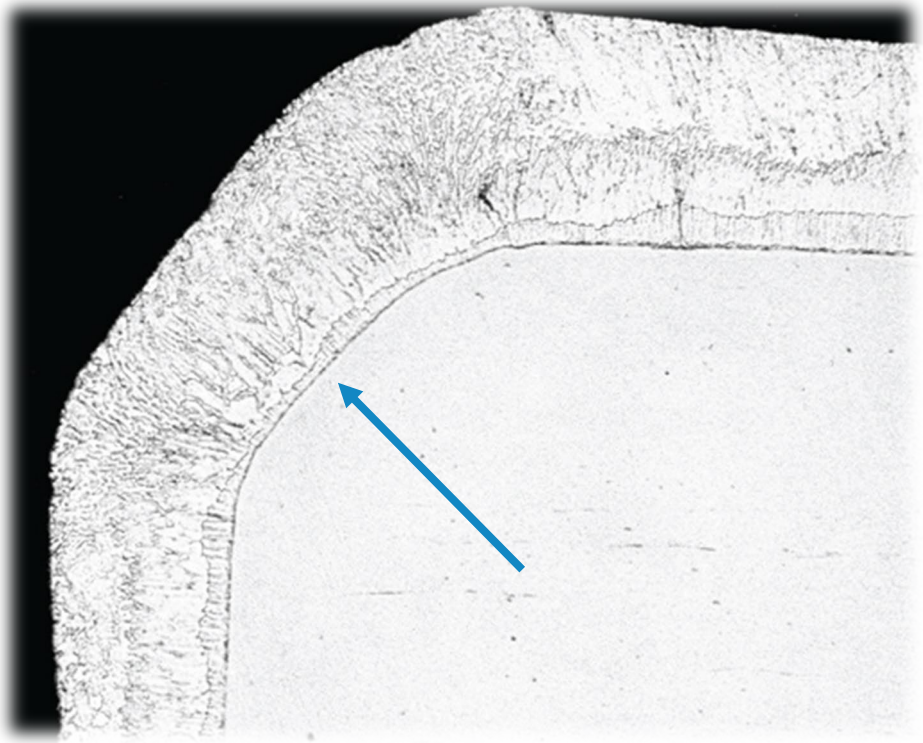
Zinc patina develops naturally as the hot-dip galvanized coating weathers slowing the overall corrosion rate

Durability: Abrasion Resistance



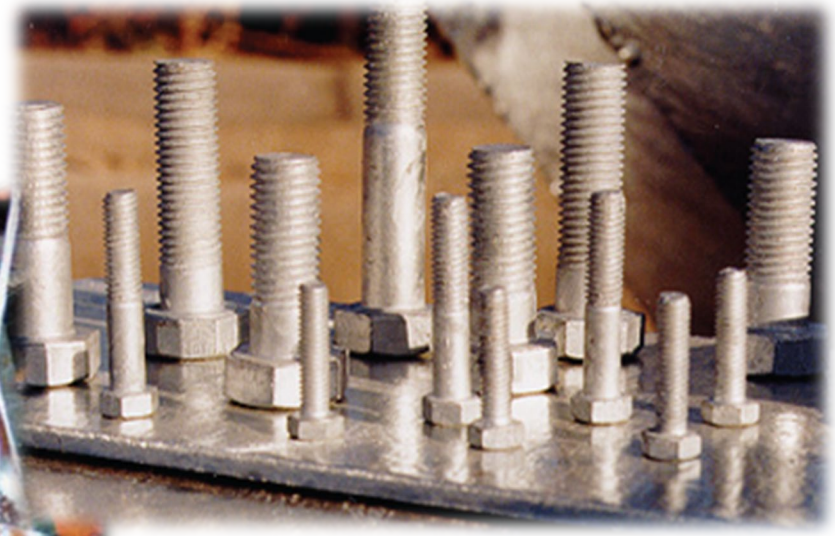
- Bond strength: 3,600 psi
  - Metallurgical bond
- Intermetallic (Zn-Fe) layers
  - Harder than base steel

Durability: Uniform Protection, Complete Coverage



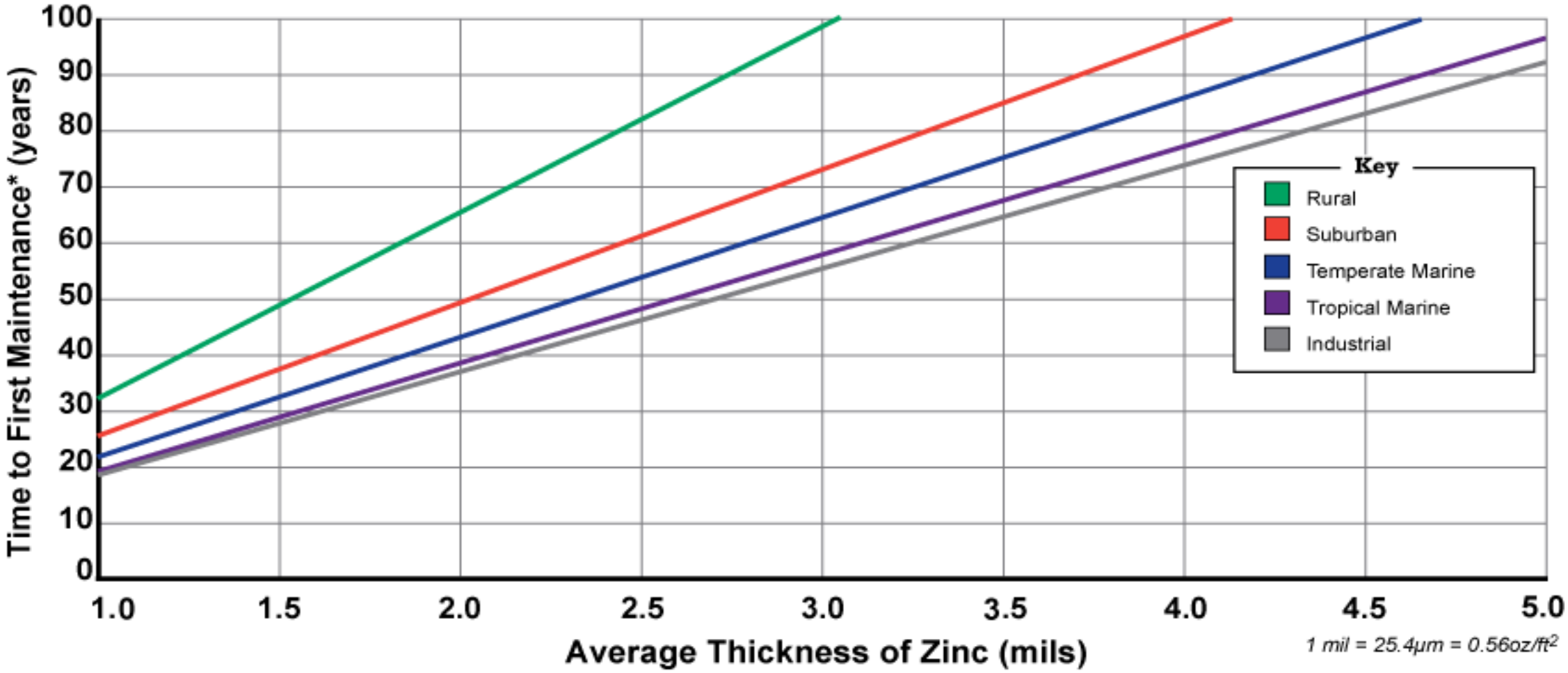
Same thickness at edge/corner
coating grows perpendicular to the surface

Interior coverage



Fully-coated threads

Time to First Maintenance



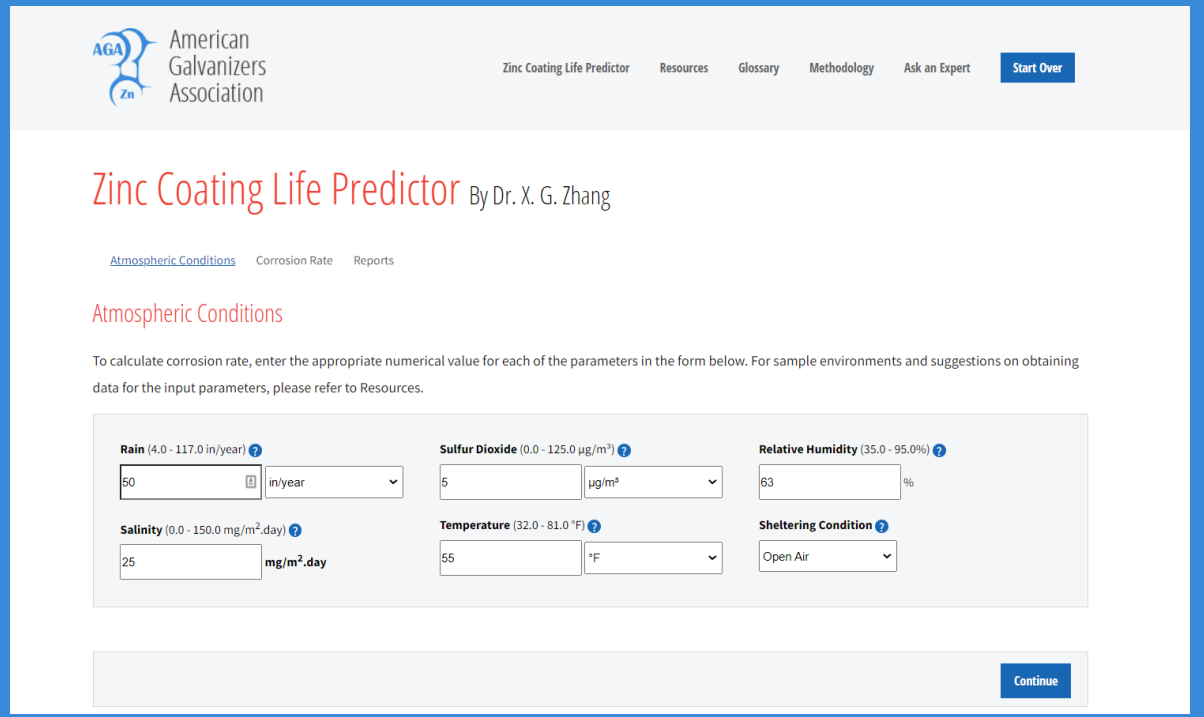
1 mil = 25.4µm = 0.56oz/ft²

**Time to first maintenance is defined as the time to 5% rusting of the steel surface.*

Zinc Coating Life Predictor

ZCLP.galvanizeit.org

- Estimate the corrosion rate of zinc (galvanized) in various environments
  - Statistical Methods
  - Neural Network Technology
  - Extensive Worldwide Corrosion Database
- Users Guide w/ Links to Collect Local Data
  - https://galvanizeit.org/knowledgebase/article/the-zinc-coating-life-predictor
- Used to develop our Time-to-First Maintenance Chart



HDG Design & Specification

Main (Galvanizer) Specs

- Requirements for coating thickness, finish/appearance, and adherence
- ASTM A123
  - General iron/steel products
- ASTM A153
  - Fasteners/small parts centrifuged or spun
- ASTM A767
  - Reinforcing steel (rebar)
  - Also has bend diameters

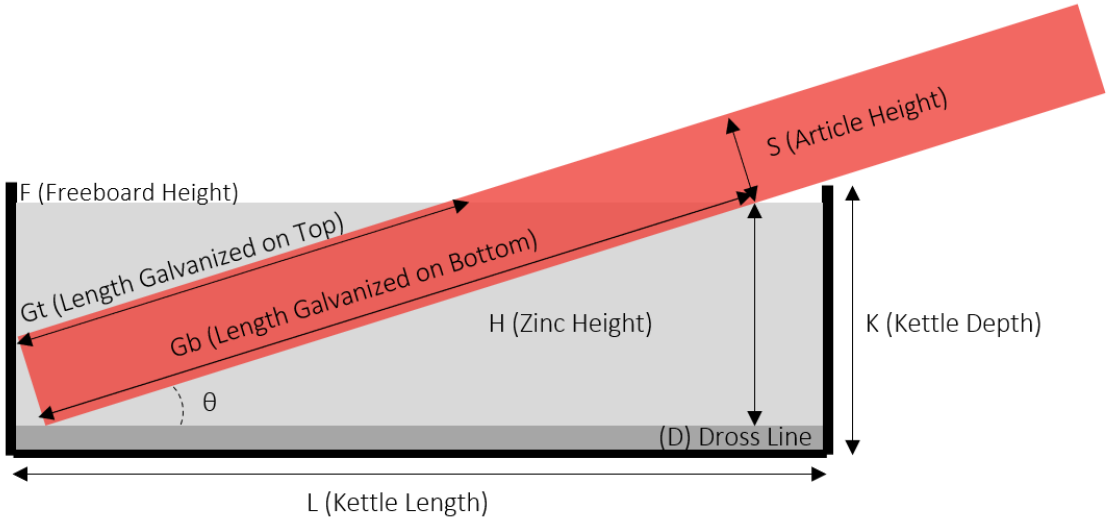
Design Supporting Specs

- Pre-Design Specs
  - ASTM A143 – embrittlement
  - ASTM A384 – minimizing warpage/distortion
  - ASTM A385 – high quality coatings
  - ASTM A1068 – life-cycle cost analysis
- Post Galvanizing Specs
  - ASTM A780 – touch-up/repair
  - ASTM D6386 – preparing HDG surface for painting
  - ASTM D7803 – preparing HDG surface for powder coating

Size & Shape

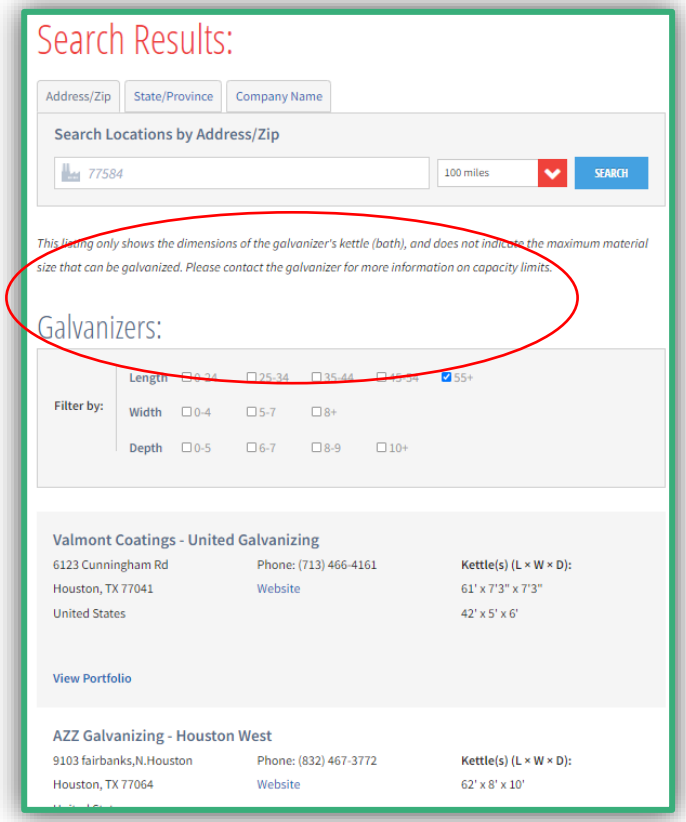
- Variety of sizes/shapes
  - Average kettle is 40 feet
  - Many kettles 50-60 feet
  - Weight can also be an important factor
- Overhead hoists/cranes move the steel
  - Chains, wires, racking systems, or perforated baskets hold materials
  - Lifting points where possible
- Design large structures in modules or sub-units and connect after HDG
- Progressive dipping for oversized pieces

Progressive Dipping

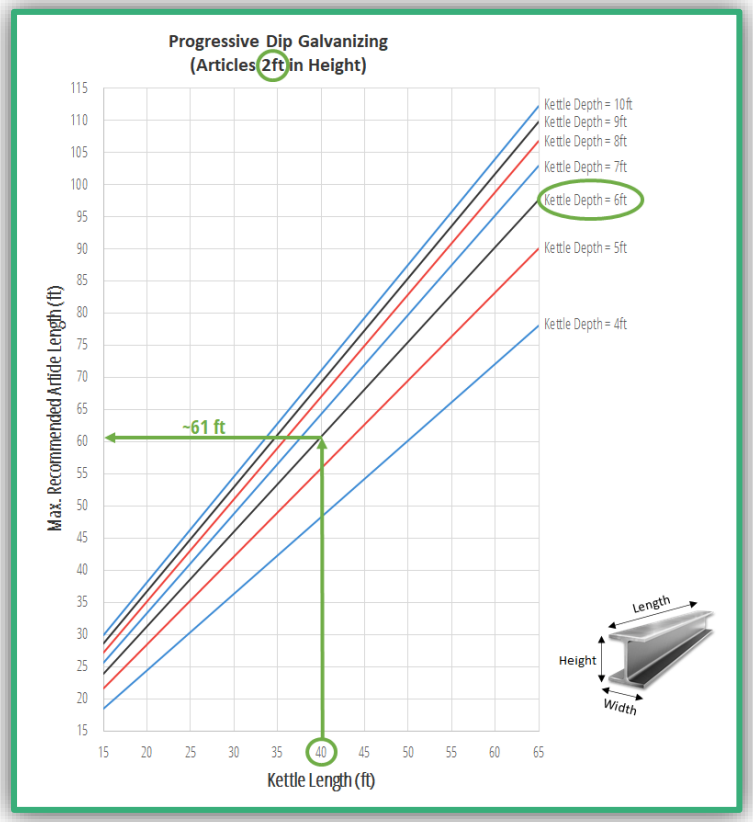


- Depends on:
  - Kettle dimensions
  - Part dimensions
  - Material handling capabilities (layout, cranes)
- Managing Expectations:
  - Overlap line appearance and roughness
  - Uneven heating
  - Increased susceptibility to warpage

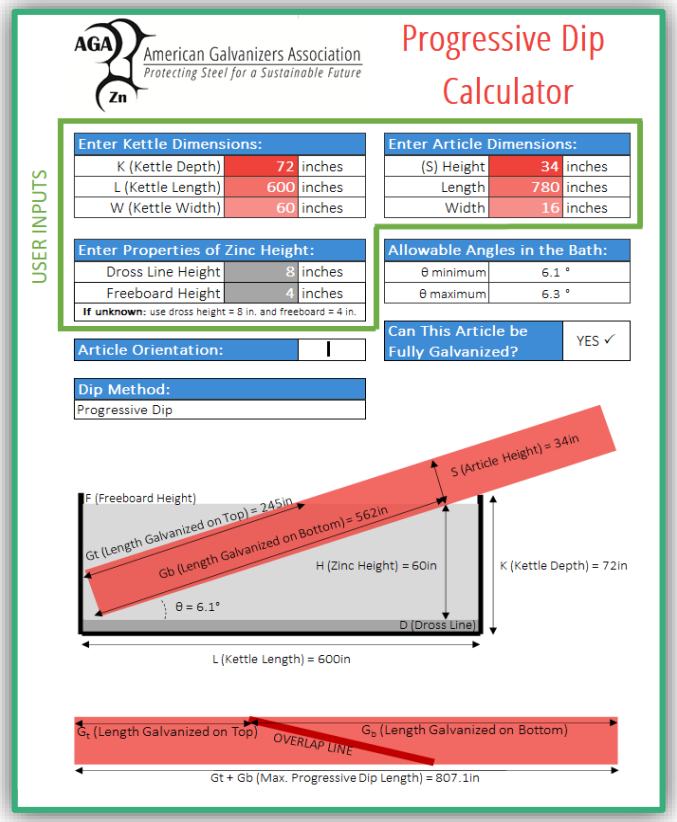
AGA Resources for Progressive Dipping



Galvanizer Locator (sort by Kettle Size)



Progressive Dip Charts

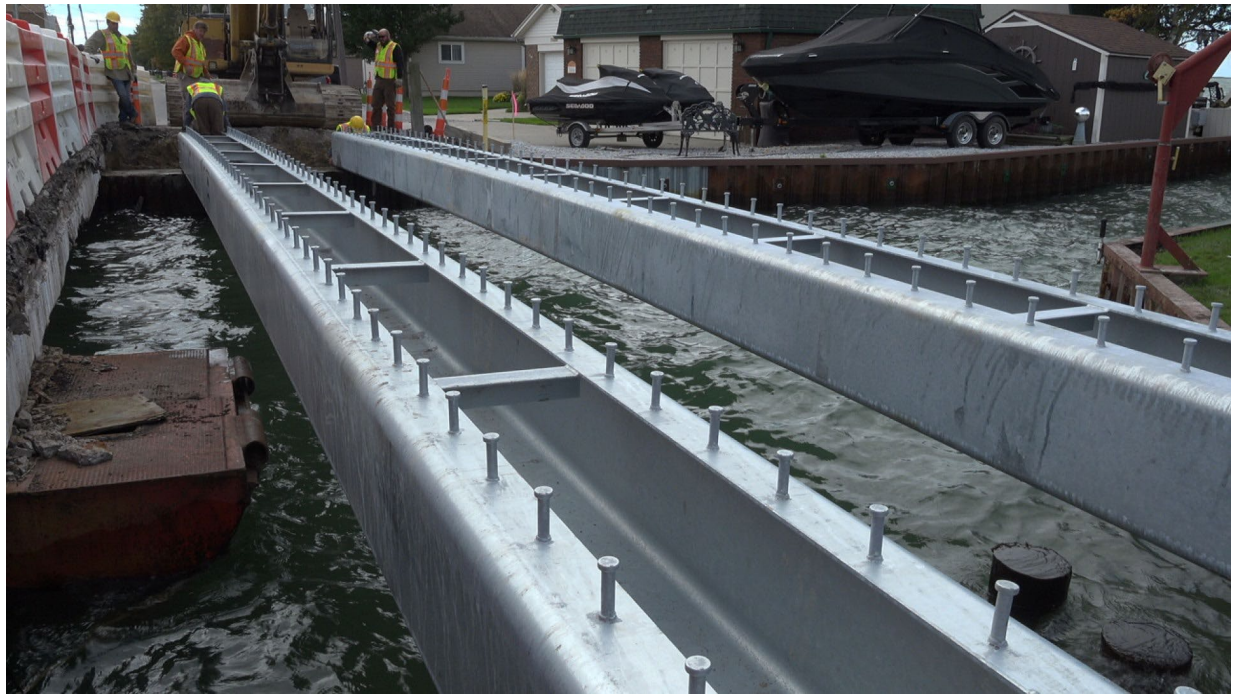


Progressive Dip Calculator

Sustainability

Environmental Advantages

- Natural, Abundant Materials
  - Essential to life
  - Iron Ore 4th
  - Zinc 24th
- Infinitely Renewable Resources
  - Both are 100% recyclable
  - Multi-cycled without loss of properties
  - High reclamation rates
    - Steel most recycled material in world, virtually 100%
    - Zinc = 80%
- Maintenance-free longevity



Weathering Steel

What is Weathering Steel?

From ASTM A709 - 2018

Grade	Yield Strength (ksi)
36	36
50	50
50S	50
50W	50
HPS 50W	50
HPS 70W	70
HPS 100W	100
50CR	50
QST 50	50
QST 50S	50
QST 65	65
QST 70	70

Grade designations ending in "W" are weathering grades

- A corrosion resistant steel that initially corrodes to form a protective patina
  - Originally developed as a high-strength steel
  - Later realized benefits of copper additive to weathering
- Corrosion products form a stable layer adhered to the steel
  - Known as the rust patina
  - Limits further oxidation
- Also known as COR-TEN Steel

Weathering Steel Specifications

- ASTM A242 (COR-TEN A) – high strength structural steel – non-load bearing
- ASTM A588 (COR-TEN B) – high strength structural steel – load bearing
- ASTM A606 – High strength sheet and strip, Hot-Rolled, Cold-Rolled
- ASTM A847 – High strength Cold-Formed Welded and Seamless Structural Tubing


Source: FHWA

Advantages of Utilizing Weathering Steel

Well formed “patina” has a dark-chocolate, almost purple hue. Fine pinholes too.

- Often perceived as the lowest cost steel option
- Construction Speed
- Design considerations
  - Atmospheric exposure
  - Limit time of wetness and details that trap moisture
  - Minimize joints
- NSBA Uncoated Weathering Steel Reference Guide
  - https://www.aisc.org/nsba/design-resources/uncoated-weathering-steel-reference-guide/

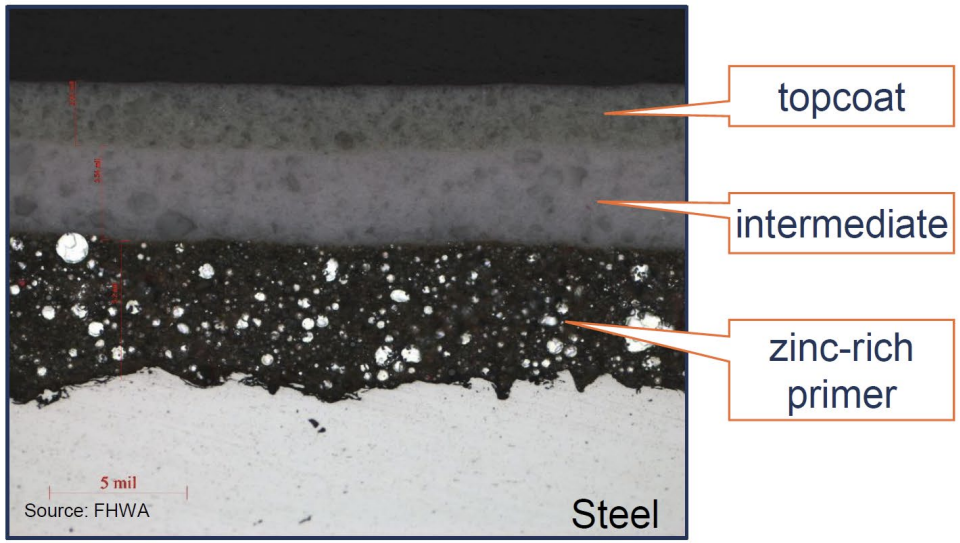
Protective Coatings

What are Protective Coatings

- Multi-Coat paint layer systems with primary purpose of corrosion protection
- Secondary purpose of aesthetic color selection
- Common Coating Systems:
  - Traditional 3-Coat Systems
    - Inorganic zinc rich paint top coated with epoxy/polyurethane paint
  - High Performance 2-Coat System
    - Multi-Coat Epoxy Paint or Polyurethane
  - Single Coat Zinc Rich System
- Compliance for Class B Slip Critical Connection Requirements
- Volume 19 of the NSBA Steel Bridge Design Handbook
  - https://www.aisc.org/nsba/design-and-estimation-resources/steel-bridge-design-handbook/

Protective Coating System Specifications

- Surface Prep: NACE/SSPC (AMPP)
- Application:
  - SSPC Paint Guide Specifications
  - Manufacturer Product Data Sheet (PDS)
- SSPC-PA 2 Procedure For Determining Conformance To Dry Coating Thickness Requirements
- Salt Spray Testing: ASTM B117

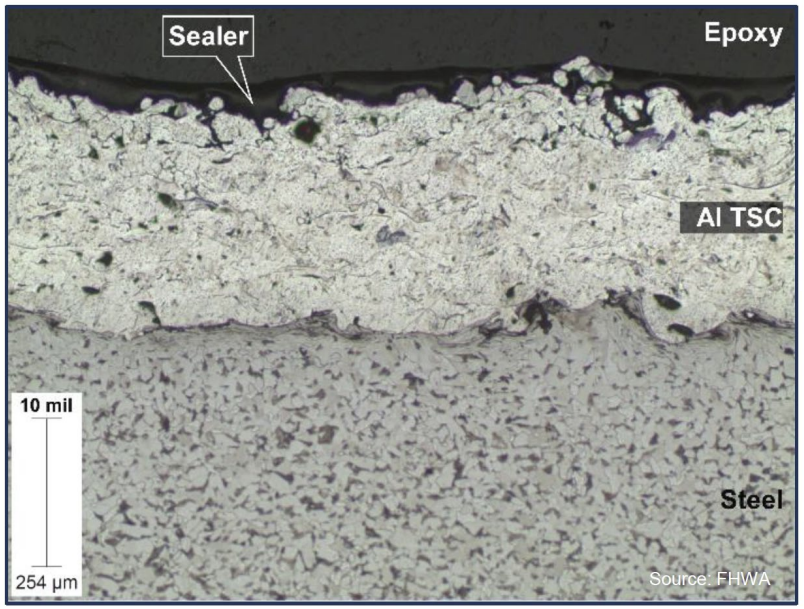


Advantages of Protective Coating Systems

- Initial Cost
- Paint has Been used a Long Time
- In Shop or In Field Application
- No Size Limit
- Aesthetics
- Greater Slip Coefficient

Thermal Spray Zinc (TSZ) aka “Metallizing”

What is Thermal Spray Zinc (TSZ) / Metallizing



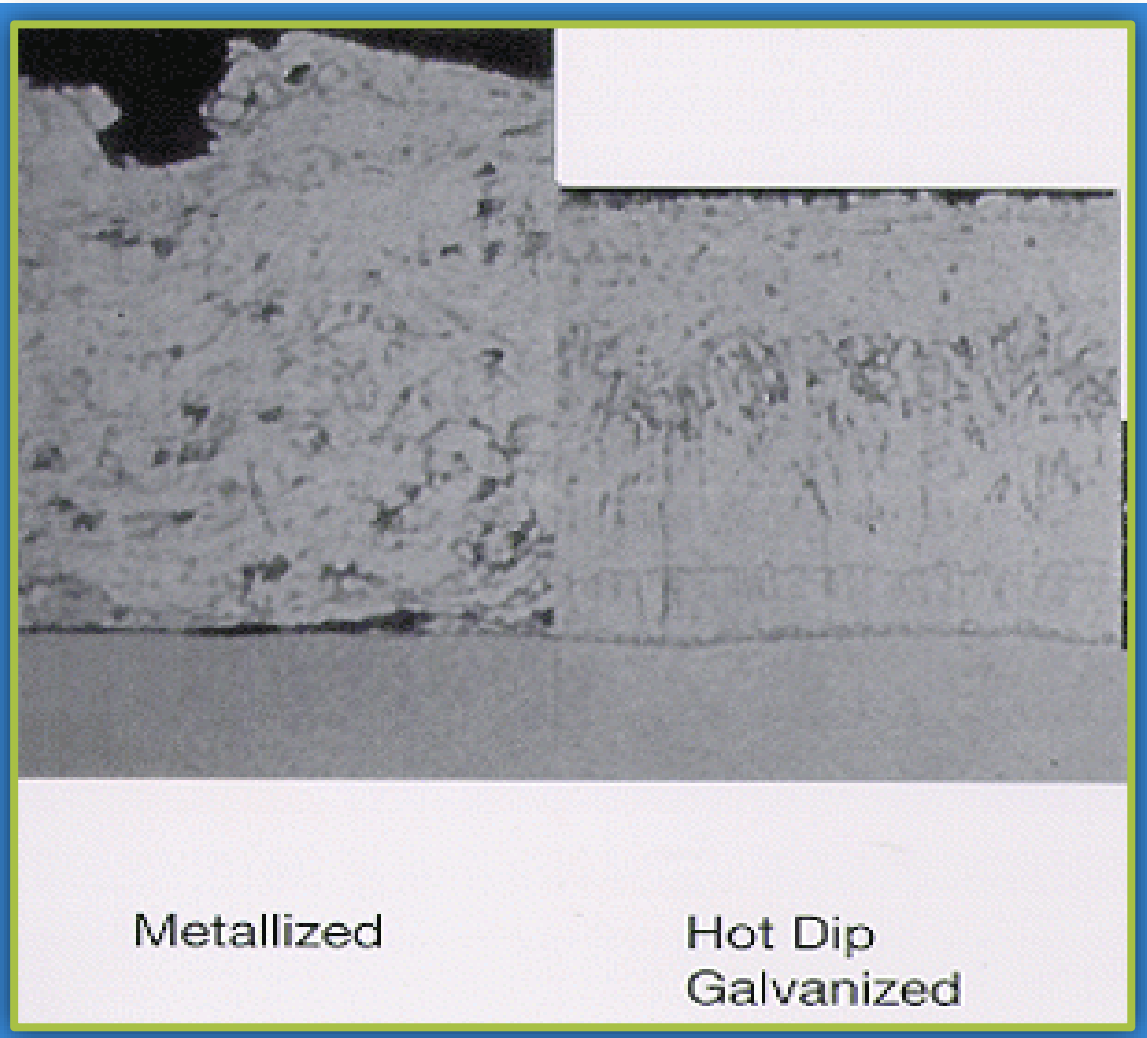
- Zinc coating applied by melting zinc powder or wire in a flame/electric arc
  - Projecting the liquid zinc droplets onto to surface
- Thermal Spray Metallizing
  - Selection of alloy
    - 100% Zinc
    - 85/15% Zinc/Aluminum
  - Recommended to be seal coated
  - Meets Class B Slip Critical Connection Requirements
- Complementary to HDG
  - Items too big for HDG can be metallized for use of both coatings in tandem

TSZ/Metallizing Specifications

- NACE No. 12/AWS C2.23M/SSPC-CS 23.00
  - *Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel*
- AWS C2.2
  - *Recommended Practices for Metallizing with Aluminum and Zinc for Protection of Iron and Steel*
- AASHTO/NSBA S8.2
  - *Specification for the Application of Thermal Spray Coatings to Steel Bridges*

Advantages of Utilizing TSZ/Metallizing

- Thickness
- Compatibility with other Zinc Coatings
- Size Range
- Sustainability



Good Metallizing Applications

- Use in Tandem with HDG
  - Used TSZ for members too large to HDG
- Designs Susceptible to Distortion/Warpage or Embrittlement
- Project Requiring on-site Application
- Extending the Life of Existing Zinc Coated Structures
- https://thermalsprayzinc.zinc.org/

Duplex Systems: HDG/Metallizing + Paint/Powder

Why Coat Galvanized/TSZ Steel?

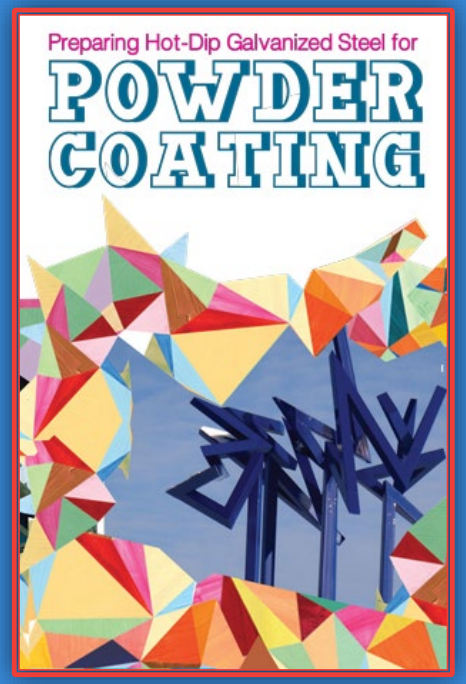
- Aesthetics
  - Branding/Architect preference
- Identification
  - Safety
- Hostile Environment
- Repair/Extend life of existing HDG
- Synergistic Effect
- Economic benefit

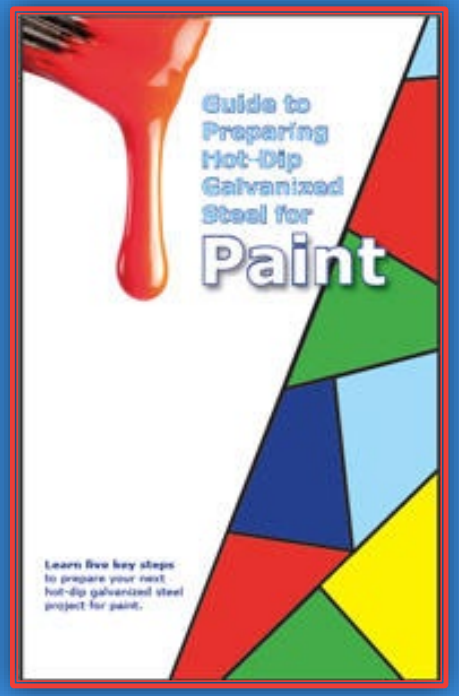
Synergistic Effect

- Paint/Powder provides barrier protection to HDG coating
- HDG “primer” eliminates underfilm corrosion and paint peeling
- Paint/powder + galvanizing provide 1.5x-2.5x sum of systems alone
  - 70 years (HDG life) + 12 years (paint life) = 123-205 years (duplex life)
- Extends maintenance cycle 1.5x-2.0x of black steel

Pertinent Specifications

- **ASTM D6386**: Surface Prep for painting based on identified initial HDG surface condition
  - Smooth, clean, profile
- **ASTM D7803**: Surface Prep for powder coating based on identified initial HDG surface condition
  - Smooth, clean, profile
  - Thermal treatment to reduce outgassing
- **SSPC SP16**: Brush-Off Blast Cleaning for HDG Steel
- **SSPC Guide 19**: Selecting Coatings for use over HDG





AGA has instructional DVDs and guide booklets that cover prep for paint (D6386) and powder coating (D7803) over HDG

Identifying Surface Condition

- HDG goes through passivation/weathering cycle as patina develops
  - Identifying surface condition is important
  - Preparation steps based on surface condition

- Newly Galvanized
  - Typically 24-48 hours
  - Little or no oxide formation
  - Avoid post treatments (quenching)
  - Zinc phosphate treatment acceptable

- Partially Weathered
  - Typically 48 hours – 12 months
  - Zinc oxide/zinc hydroxide on surface
  - Potentially contaminated with organic compounds (dirt, oils)
  - Surface post-treatment unknown

- Fully Weathered
  - Typically >12 months
  - Zinc carbonate on surface
  - Potentially contaminated with organic compounds (dirt, oils)
  - Surface treatments are gone

Comparison of Bridge Corrosion Protection Systems

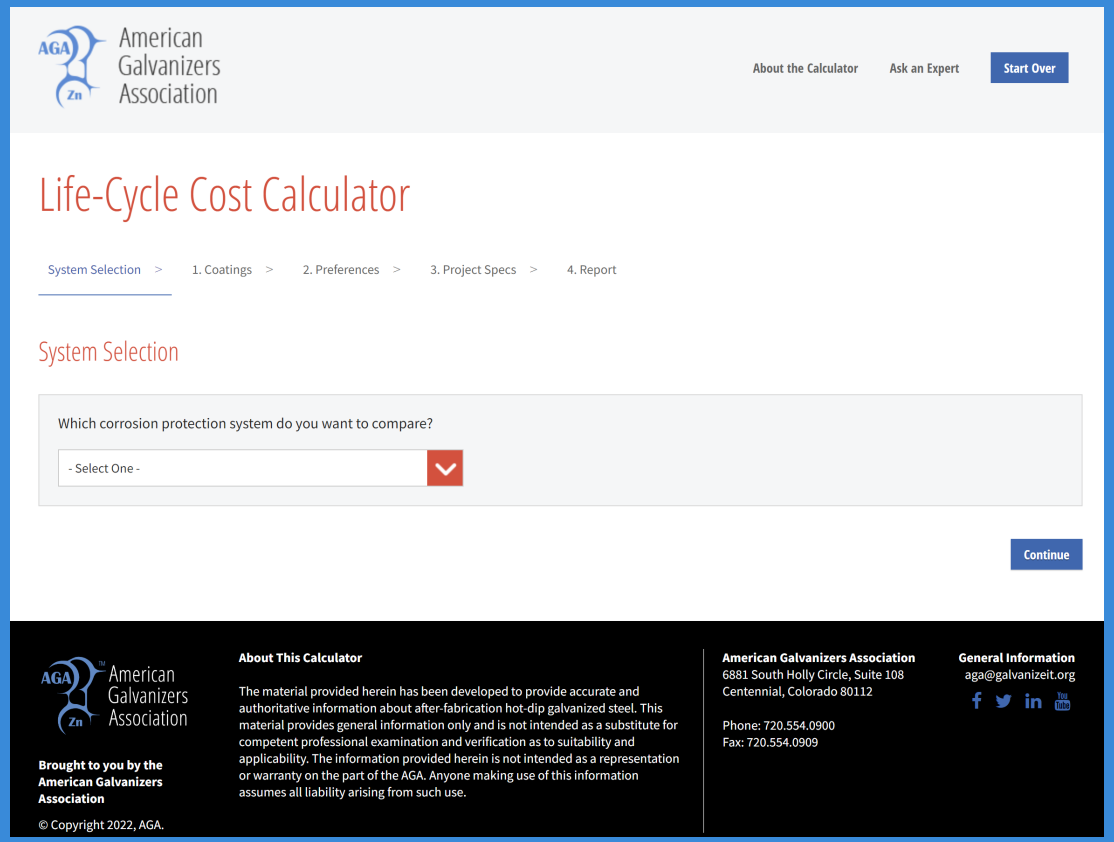
Corrosion Protection System Economics

- Initial Cost Benefits
  - Overall material and application costs
  - Time savings in construction
- Life-Cycle Cost Savings
  - Total cost throughout project life
  - Includes maintenance costs and time value of money (interest/inflation)
- Life-Cycle Cost Calculator to ASTM A1068
  - Automated at lccc.galvanizeit.org

Life-Cycle Cost Calculator

- Initial Cost Benefits
  - Overall material and application costs
  - Time savings in construction
- Life-Cycle Cost Savings
  - Total cost throughout project life
  - Includes maintenance costs and time value of money (interest/inflation)
- Life-Cycle Cost Calculator to ASTM A1068

Reference Link: https://lccc.galvanizeit.org/



LCCC: Inputs

PROJECT SIZE

Enter amount of steel to be coated.

ft² tons

EXPECTED LIFE-SPAN

Amount of time before this structure is no longer maintained or in use.

Years

STRUCTURE TYPE

Specify the size and/or complexity of the structure.

- Select One -

MEMBER TYPE

Select the project's structural makeup.

- **Typical mix size/shapes** 250 ft² / ton
- **Large Structural** 100 ft² / ton
- **Medium Structural** 200 ft² / ton
- **Light Structural** 400 ft² / ton
- **Light Trusses** 500 ft² / ton

SERVICE LIFE ENVIRONMENT

Select the environment that represents your project's location.

- **Rural** Mild/Low Corrosion (C2)
- **Industrial** Moderate/Medium Corrosion (C3)
- **Heavy Industrial** Severe/Very High Atmospheric Corrosion (C5-I)
- **Seacoast** Very high Atmospheric Corrosion (C5-M)

LCCC: Report

Life-Cycle Cost Calculator

System Selection > 1. Coatings > 2. Preferences > 3. Project Specs > 4. Report

Cost-Comparison Report

Review and customize before printing

Cost-Comparison Report

The cost of galvanizing vs. a paint system

Cost Comparison

HDG vs. IOZ/Epoxy/Polyurethane

	HDG	Paint System
Initial Cost Per ft²	$2.16	$4.98
Total	$108,000.00	$249,050.00
Life-Cycle Cost Per ft²	$2.16	$31.39
Total	$108,000.00	$1,569,500.00
AEAC Per ft²	$0.07	$1.08

For this project...
HDG Life-Cycle Cost Savings: 93%

DETAILED COST COMPARISON

HDG vs. IOZ/Epoxy/Polyurethane

Cost Of Galvanizing	Today's Cost	Net Future Value	Net Present Value
Original Galvanizing	$2.16	$2.16	$2.16
Total Price / ft²	**$2.16**	**$2.16**	**$2.16**

Cost Of Paint System	Today's Cost	Net Future Value	Net Present Value
Original Painting	$4.98	$4.98	$4.98
Touch-Up - Year 21	$2.49	$5.68	$3.05
Maint. Repaint - Year 31	$4.48	$15.42	$6.08
Full Repaint - Year 42	$8.47	$43.97	$12.71
Touch-Up - Year 63	$2.49	$29.47	$4.58
Total Price / ft²	**$22.91**	**$99.52**	**$31.39**

PRINT PREVIEW

CUSTOMIZE REPORT

Project Name

Subtitle

Your Company's Name

Address

City, State & Zip

Your Name

Title

Tel

Email

Update

Performance Expectations

- Transportation Research Board Meetings
  - Jan 2022 – Washington, DC
- "Modern Corrosion Protection Systems"
  - Steel Bridge Corrosion Resistant Steels and Coatings Workshop
  - Justin Ocel, Ph.D, P.E.
    - Senior Structural Engineer
    - Office of Innovation Implementation

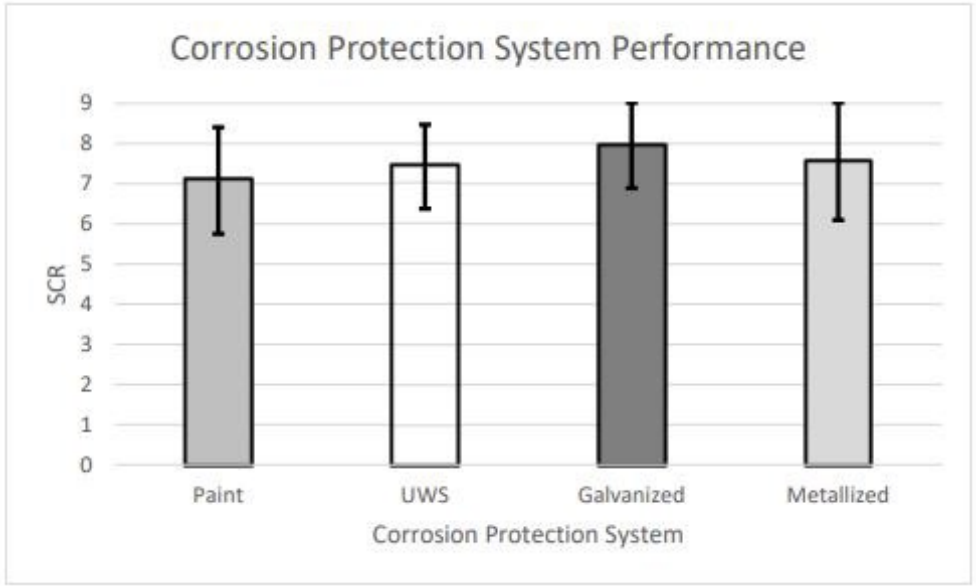
Time (years) for 5-10% Coating Breakdown[1]

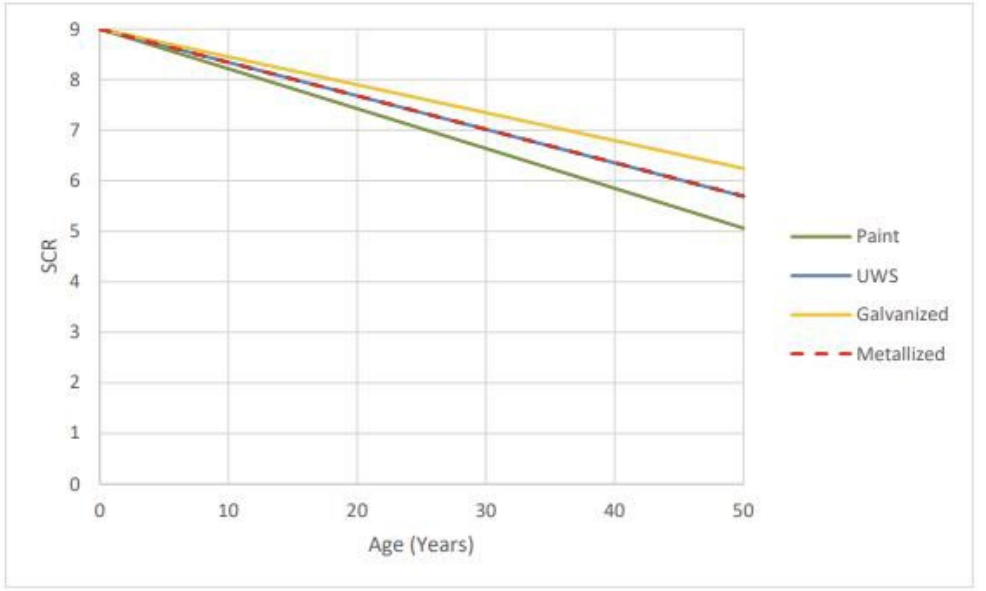
Coating System	Mild (rural)	Moderate (industrial)	Severe (industrial)	Severe (marine)
3-coat (OZ / E / U)	27	18	12	12
3-coat (IOZ / E / U)	30	21	15	15
2-coat (OZ / Polyaspartic)	24	17	12	12
1-coat IOZ	27	17	12	12
TSC Zn	33	22	16	16
Hot-Dip Galv. (4 mil)	100	90	72	72
UWS	-	-	-	-

[1]Helsel, J. L., Reina, M., Lanterman, R. (2014). "Expected Service Life and Cost Considerations for Maintenance and New Construction Protective Coating Work." Paper No. 4088. CORROSION March 9-13. NACE International

Durability of Steel Bridge Corrosion Protection Systems Study

- Principal Investigator
  - Jennifer McConnell, Ph.D. (University of Delaware
- Submitted to American Institute of Steel Construction – April 21, 2022
  - Link to full report
- Two Evaluation Methods
  - Statistical Analysis of Existing Long-Term Performance Data of Corrosion Protection Systems
    - National Bridge Inventory (NBI)
  - Accelerated Corrosion Testing
- Results
  - HDG Highest Average SCR in Existing LTPD





Steel Bridge Maintenance

Steel Bridge Maintenance

- Coating Selection
  - Single coat overcoat
  - Multicoat system
  - Traditional 3-coat system
  - High performance 2-coat system
  - Single coat zinc rich system
  - Thermal Spray Zinc (TSZ)
- Overcoating
  - Spot paint
  - Zone paint
  - Full overcoat
- Blast and Repaint
  - Surface preparation

    AMPP SP10 vs AMPP SP6

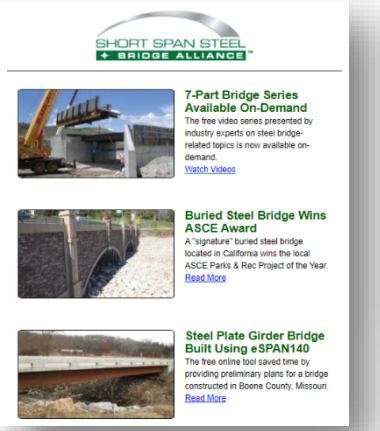
Bridge Washing

- Cleaning: removal of debris and/or contaminants
- State of practice:
  - A standard maintenance practice
  - Need and benefit is generally unquestioned
- Best practices (quantitative and qualitative) described by The User's Guide to Bridge Cleaning (AASHTO TSP2 Pocket Guide)

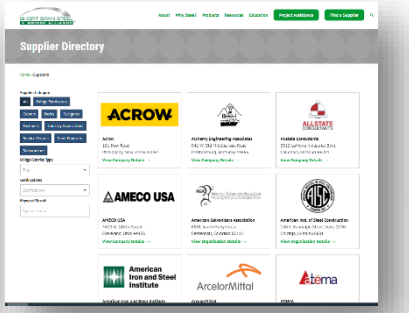
- Removes debris and/or contaminants
  - That trap moisture
  - Chlorides
- Literature supports that washing effectively removes up to 95% of surface chlorides (Alland et al.)
- Chlorides + steel = rust
- Literature supports reduced life-cycle cost
- Longer service lives

5 Ways to Keep Learning About Steel Bridges

1. Subscribe to the Weekly Newsletter



2. Find a Supplier



3. Design a Bridge in 5-Minutes

eSPAN140™

4. Receive Free Project Assistance

5. Schedule a Workshop/Webinar

Free Customized Workshops for Counties, DOTs, and Design Firms

Topics: Education, Events, Professional, Recommended

Short span bridges provide vital links in the nation's infrastructure network. Yet, nearly a quarter of these bridges are classified as structurally deficient or functionally obsolete.

According to ASCE, more than 30% of existing bridges have exceeded their 50-year design life. This situation presents a significant challenge for cash-strapped state and local governments.

The SSSBA has developed technological and design innovations for bridges under 140 feet that save significant time and costs for county and state bridge officials.

Over the past 10-years, over 17,000 bridge owners and designers have learned about the cost and time advantages of short span steel bridges in SSSBA workshops and conferences throughout North America.

And now, the SSSBA is offering **complimentary** customized educational guest speakers/webinars and workshops (on-site or virtual) specifically for county engineers, state DOTs, and design firms. The webinars/workshops are taught by industry experts with decades of experience in the cost-effective design and construction of short span bridges.

The workshops can be set up as:

- 1-2 hour webinar on a specific topic (can be used as a "guest speaker" for your event).
- 3-4 hour (half-day) workshop to provide practical information on the safe and cost-effective design, detail, fabrication and installation of short span steel bridges.
- 6 hour (full-day) session to provide an in-depth overview of short span steel bridges.

View Sample Agenda

Suggested topics to select from include:

- Practical and Cost-Effective Steel Bridge Design
- Free Design Tools (eSPAN140 and SIMON)
- Pre-engineered Bridge Solutions
- Coating Solutions (galvanized, painted, and weathering steel)
- Innovative/Accelerated Bridge Construction Options
- Case Studies (from local counties)
- Buried Soil Steel Bridge Structure Alternatives
- Life-Cycle Analysis

For more information or to customize a workshop for your organization, please contact:

- Dan Snyder (Director of the SSSBA) at dsnyder@steel.org or 301-367-6179.
- Michael Barker (University of Wyoming & SSSBA Director of Education) at barker@uwyo.edu

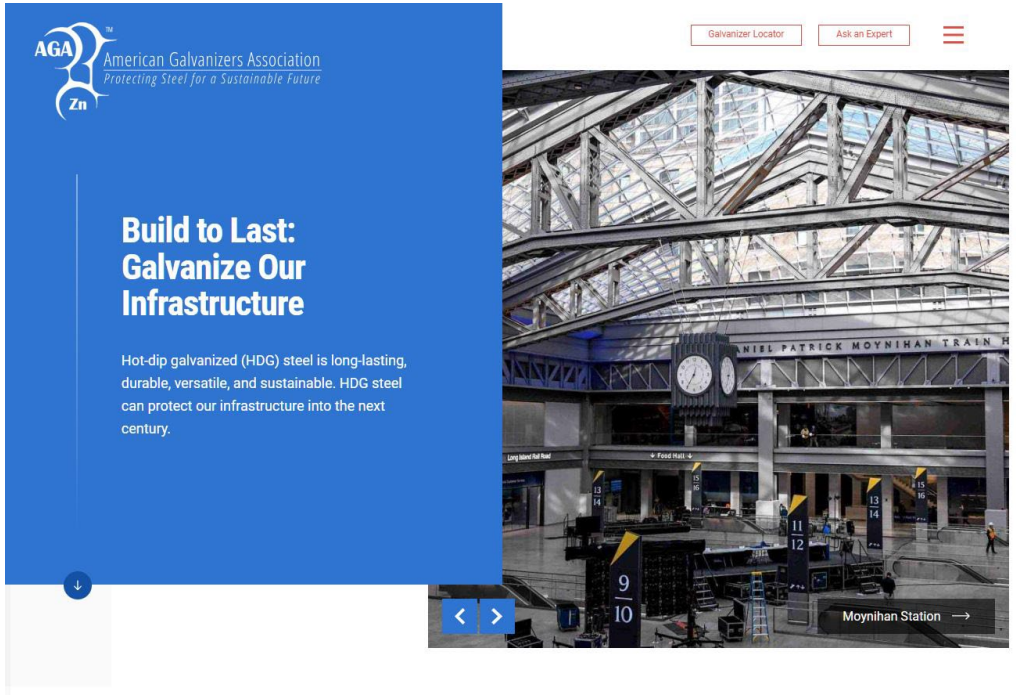
www.ShortSpanSteelBridges.org

Questions? Dan Snyder, Director, SSSBA, dsnyder@steel.org

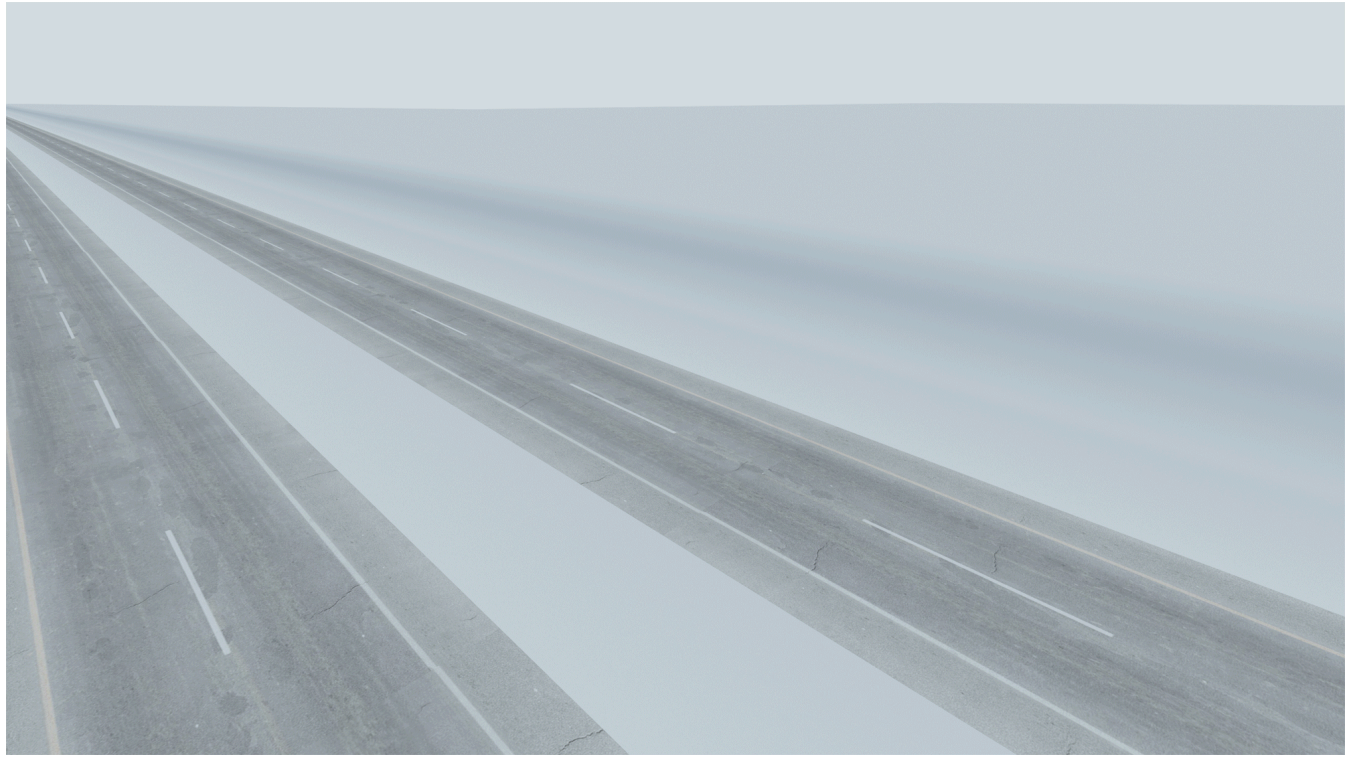
Twitter: @ShortSpanSteel

Facebook: Short Span Steel Bridge Alliance

NEW WEBSITE: TECH INFO & CASE STUDIES



markets.galvanizeit.org



https://markets.galvanizeit.org/bridges-highways

American Galvanizers Association
Protecting Steel for a Sustainable Future

American Galvanizers Association
Protecting Steel for a Sustainable World

Questions & Comments

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